

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
12 May 2005 (12.05.2005)

PCT

(10) International Publication Number
WO 2005/043138 A1

(51) International Patent Classification⁷: **G01N 21/64, A61B 5/00**

(21) International Application Number: **PCT/IB2004/003559**

(22) International Filing Date: 29 October 2004 (29.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/515,697 31 October 2003 (31.10.2003) US

(71) Applicant (for all designated States except US): ART ADVANCED RESEARCH TECHNOLOGIES INC. [CA/CA]; 2300 Alfred-Nobel Boulevard, Saint-Laurent, Quebec H4S 2S4 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): HALL, David, Jonathan [GB/US]; c/o University of California, San Diego, 200 West Arbor Drive, San Diego, CA 92103-8756 (US). MA, Guobin [CN/CA]; 307 Lagace Avenue, Dorval, Quebec H9S 2M2 (CA). LESAGE, Frederic [CA/CA];

5192 Chabot, Montreal, Quebec H2H 1Y8 (CA). GAL-LANT, Pascal [CA/CA]; 4380 Levesque Boulevard, Apt. # 202, Laval, Quebec H7W 5M8 (CA).

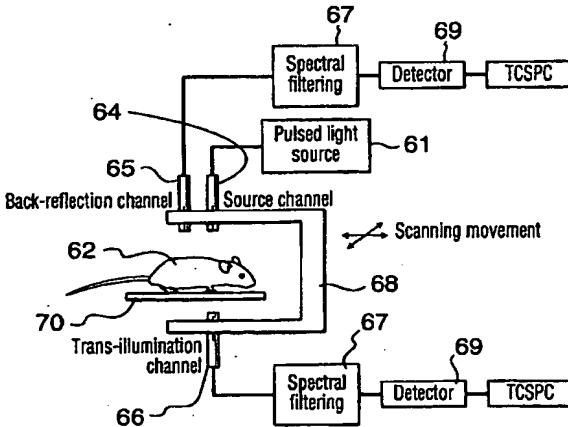
(74) Agent: OGILVY RENAULT; 45 O'Connor Street, Suite 1600, Ottawa, Ontario K1P 1A4 (CA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EB, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

[Continued on next page]

(54) Title: A TIME-DOMAIN METHOD AND APPARATUS FOR DETERMINING THE DEPTH AND CONCENTRATION OF A FLUOROPHORE IN A TURBID MEDIUM



WO 2005/043138 A1

(57) Abstract: Methods and apparatuses for determining the depth and concentration of fluorophores in a turbid medium are disclosed. The method advantageously provides for a rapid estimation of the depth of the fluorophore using characteristics of a temporal point spread function. The concentration of the fluorophore can be determined using the method of the present invention by combining a calculated depth of the fluorophore with a measurement of the intensity of the emitted fluorescence. The intensity can be accurately measured by the apparatus disclosed herein which combine back-reflection and trans-illumination geometries for the source of light injecting and detection.